

PROPOSED SPECIES/CRITICAL HABITAT:

Southern Oregon and California Coastal ESU chinook salmon

Within the action area, chinook salmon have been documented in the Freshwater Creek, Elk River, Yager Creek, Van Duzen River, Eel River, and Mattole River drainages. The Final EIS/EIR estimates that there are approximately 82 miles of suitable habitat for chinook salmon within the action area.

In Freshwater Creek, HFAC downstream migrant traps captured 1,270 0-plus age chinook salmon from the mainstem in 1989. In 1996, 5 0+ chinook salmon were trapped from the mainstem (IFR 1998). According to the Final EIS/EIR, CDFG (1995) reported carcass survey results for the Elk River and Yager Creek. The survey found 130 chinook salmon carcasses in the North Fork Elk River and 116 carcasses in the South Fork Elk River. Within the Yager Creek watershed, a total of 927 chinook salmon carcasses were found between 1987 and 1995. The same survey recorded a total of 909 chinook salmon carcasses in the Van Duzen River watershed. Electrofishing surveys completed by CDFG in 1991 did not find any chinook salmon in these watersheds (IFR 1998). In the Eel River, CDFG (1995) reported finding chinook salmon carcasses in Bear, Carson, Jordan, Chadd, and Larabee Creeks. Electrofishing surveys from 1990 to 1994 did not document the presence of chinook salmon within the Eel River watershed (IFR 1998, Final EIS/EIR). MSG (1997) provided data on chinook salmon redds and carcasses from the Mattole River from 1981 to 1997 (cited in IFR 1998). Estimated chinook salmon escapement range from 3000 adults in 1981 to 100 adults in 1990. The 1997 estimates were 800 adult chinook salmon.

According to the Final EIS/EIR, PALCO has released hatchery-raised chinook into the Yager Creek watershed and streams in the Humboldt WAA. Releases range from 2,636 to 85,500 fish per year in Yager Creek. Since 1964, a total 86,855 chinook salmon have been released into the Humboldt WAA.

Proposed coho salmon critical habitat

Critical habitat for the SONCC ESU coho has been proposed for all accessible river reaches within the action area. The only identified barriers within these drainages, Matthews Dam (Mad River) and Scott Dam (Eel River), are upstream of the action area. Currently, all rivers identified as critical habitat are considered vital to the survival and recovery of coho salmon in the SONCC ESU. Factors within the action area that may affect critical habitat include land management activities such as timber harvesting, agriculture, residential development, gravel mining, recreational activities, and livestock grazing, that may impact or alter the riparian functions (shade, sediment control, nutrient and chemical regulation, streambank stability, and input of woody debris and organic material). Other threats to critical habitat within the action area include road construction, gravel mining, stream enhancement, bank stabilization, and water diversions. These activities have the potential to alter essential habitat features and degrade properly functioning conditions.

Proposed chinook salmon critical habitat

Critical habitat for the SOCC ESU has been proposed for all accessible river reaches within the action area. Similar to the proposed designation for SONCC coho salmon ESU, the only identified barriers within these drainages, Matthews Dam (Mad River) and Scott Dam (Eel River), are upstream of the action area. Currently, all rivers identified as critical habitat are considered vital to the recovery and survival of chinook salmon in the SOCC ESU. Factors within the action area that may affect critical habitat include land management activities such as timber harvesting, agriculture, residential development, gravel mining, recreational activities, and livestock grazing, that may impact or alter the riparian functions (shade, sediment control, nutrient and chemical regulation, streambank stability, and input of woody debris and organic material). Other threats to critical habitat within the action area include road construction, gravel mining, stream enhancement, bank stabilization, and water diversions. These activities have the potential to alter essential habitat features and degrade properly functioning conditions.

UNLISTED SPECIES:

Bank swallow

Species

Numbers

No surveys for this species have been conducted within the action area. No records of this species are known in the action area, although it probably occurs as a very rare migrant or summer visitor, especially along lower portions of the Eel River. An estimated 100 to 150 breeding adults occur within the regional area (Harris 1996).

Landscape Comparison

None of the estimated breeding adults in the regional area are known to breed in the action area.

Distribution

No information is available on the species' distribution.

Reproduction

No colonies are known in the action area, and no trend data exist for the regional area. Within the regional area the only currently known nesting colonies are in Del Norte County along the lower Smith River and at the Crescent City landfill (Harris 1996). However, Talmadge (1947) reported five scattered single-pair nest sites in Humboldt County; the site closest to the action area was one at an unspecified location somewhere along the Van Duzen River. No additional information on the sites is discussed by Talmadge (1947).

Suitable habitat

Landscape comparison

The amount of suitable habitat existing along Class I streams in the action area and the proportion of the range-wide or regional habitat contained in the action area are unknown. The action area constitutes less than 0.01 percent of the total breeding range (USDA Forest Service 1994).

Factors affecting species and suitable habitat in the action area

Other completed or contemporaneous actions

Road or bridge construction, or gravel mining may have affected some potential habitat in the action area.

Other protective measures

While no specific State of California protective measures exist for this State threatened species, measures are implemented to avoid take when State biologists conduct consultations for projects under their jurisdiction (CDFG 1995).

Pacific fisher

Species

Numbers

No estimates on the number of fishers exist for the action or regional areas.

Fisher have been detected in the action area but are thought to be rare. For example, during 2,000 camera nights in 1995 and 1996 on PALCO lands four fishers were detected. Fishers may be more abundant in northwestern California than anywhere else in the United States (Powell and Zielinski 1994). Fisher numbers decrease in the southern Coast Ranges in northwestern California (R. Kluge, pers. comm., January 15, 1999).

Distribution

All known fisher detections on PALCO lands have been within the Yager and Humboldt WAAs. Although surveys were conducted in all five of the major WAAs on the ownership, the survey methodology was not sufficient to determine if areas without detections were unoccupied. Based on survey results in the coastal redwood region, forests with an abundance of hardwood and Douglas-fir are more likely to provide suitable habitat for fishers. Douglas-fir makes up at least 20 percent of many stands classified as redwood on PALCO lands (S. Chinnici, pers.comm., January 14, 1998).

Reproduction

Reliable data on fisher population trends do not exist in the action or regional areas. Although they had limited information and provided no quantitative analysis, Schempf and White (1977) thought fishers were "common and increasing in numbers", Yocom and McCollum (1973) thought they were "increasing" in interior northwestern California. Recent research in northwestern California does not provide information to estimate population trends.

Suitable habitat

Landscape comparison

On PALCO lands there are an estimated 69,231 acres of LSH. This constitutes approximately 32 percent of the current ownership outside of the Headwaters acquisition area, and Grizzly Creek Complex. Of these acres, approximately 59,983 acres are in patches at least 80 acres in size. This may be a conservative estimate of suitable resting and denning habitat on PALCO lands, since this figure does not include CWHR 4D stands, which may be suitable for this subspecies when legacy

components such as down logs, large snags, and large green trees are present. Table 31 provides information on the amount of potentially suitable resting and denning habitat present at different landscape levels.

Table 31. Comparison of acres of potentially suitable resting and denning habitat for Pacific fishers present within the subspecies range at different landscape levels.

Landscape level	Acres of LSH or equivalent	Acres of CWHR 4D or equivalent
PALCO lands ¹	69,231	55,380
Action area (outside of PALCO lands) ²	62,491	122,908
Regional area (outside of PALCO lands) ^{2,3}	791,214	1,407,076
Range-wide	N/A	N/A

¹ Habitat information derived from PALCO 1999. Vegetation inventory. Unpublished technical information.

² Habitat information for California derived from The Resource Agency of California (1993). The Report of the California Timberland Task Force. Revised May 1996.

³ The regional area is defined as Mendocino, Humboldt, and Del Norte Counties, California, and Curry County, Oregon. Habitat information provided for Curry County is only for the Siskiyou National Forest and Coos Bay and Medford Districts of the BLM. There is an additional undetermined amount of potentially suitable Pacific fisher habitat on private lands within Curry County, OR.

Habitat classified as CWHR 3M and larger (CWHR 3D, 4M, 4D, 5M, 5D, and 6) is considered potentially suitable foraging habitat for fishers. There are approximately 153,798 acres of habitat classified as CWHR 3M or larger of conifer and montane hardwood conifer habitat types on PALCO lands outside of the Headwaters acquisition area and the Grizzly Creek Complex. This constitutes approximately 72 percent of the current PALCO ownership. There is an additional 6,665 acres of potential foraging habitat in the Headwaters acquisition area, and 1,243 acres within the Grizzly Creek Complex.

Factors affecting species and suitable habitat in the action area

Other completed or contemporaneous actions

Refer to **Baseline common to all species** section above.

Other protective measures

California closed the trapping season for the harvest of fishers in 1945, although fishers are still caught incidentally in traps set for other fur-bearing mammals.

There are no Federal regulatory measures that specifically protect the Pacific fisher or its habitat. Consideration of significant impacts to listed and non-listed species is provided for in the CEQA Regulations (14 CCR §15380) and the CFPRs (14 CCR § 919.4) respectively. These State regulatory measures may provide some level of protection for the Pacific fisher.

Red tree vole

Species

Numbers

There are approximately 90 recorded observations of red tree voles or red tree vole nests on PALCO lands. No additional information is available on the population size on PALCO lands.

Distribution

Red tree voles were opportunistically observed throughout all of the WAAs on the ownership. Multi-species surveys conducted in mid-1990s documented red tree voles in the Humboldt, Yager, and Bear-Mattole WAAs. As found elsewhere in the species range, red tree vole nests were found to be patchily distributed (i.e., several nests were found in close proximity to one another, but clumps of nests were not necessarily evenly distributed within or between stands).

Reproduction

Red tree vole nests have been located on PALCO lands. No information is available on reproduction trends of red tree voles on PALCO lands. Currently, patches of LSH ranging from 80 to over 1,000 acres in size exist within the five major WAAs on the ownership. It is likely that red tree voles are successfully reproducing within these stands.

Suitable habitat

Although red tree vole nests have been found in young (20 to 60 year-old) stands, it is unclear how sustainable these populations are through time. Since red tree voles have been found to be more abundant in mature and old-growth stands, PALCO lands classified as LSH (including residual old-growth and uncut old-growth) are assumed to have the highest likelihood of providing habitat capable of sustaining red tree vole populations through the life of the permit and beyond. Other seral stages such as CWHR 4D are likely to provide some level of suitable habitat. Since younger trees do not commonly have large limb structures capable of supporting large red tree vole nests, these habitat are considered lower in quality than LSH.

Under the Final SYP/HCP, habitat typed as redwood can include up to 50 percent of the conifer cover in Douglas-fir trees (Volume III, Part B, page 32 of the SYP/HCP). A majority of the project area outside of the Bear-Mattole WAA is classified as redwood, and according to PALCO (Sal Chinnici, pers. comm., November 23, 1998), Douglas-fir makes up at least 20 percent of many redwood dominated stands across the PALCO lands. Sample plot data can be found in Volume II, Part K, of the SYP/HCP. Additional information on tree species composition within these stands is not available at this time. Of the 90 records of red tree voles or red tree vole nests on PALCO lands, approximately 82 percent of these localities are within habitat typed as redwood (Sal Chinnici, pers. comm., January 14, 1999). Based on this information, for the purpose of this

analysis, it is assumed that habitat classified as Douglas-fir or redwood on PALCO lands can support populations of red tree voles.

Approximately 69,231 acres of LSH (redwood, Douglas-fir, and montane hardwood/conifer habitat types combined) occur on PALCO lands. Of these acres, there are 12,746 acres of LSH within patches 80 to 475 acres in size and 8,830 acres of LSH within patches 475 to 1,000 acres in size and 38,407 acres of LSH within patches > 1,000 acres in size. Other forest seral stages, such as CWHR 4D, may provide suitable habitat of a lower quality for red tree voles. Table 32 provides information on the amount of potentially suitable red tree vole habitat present at different landscape levels.

Table 32. Comparison of acres of potentially suitable red tree vole habitat present within the species range at different landscape levels.

Landscape level	Acres of LSH	Acres of CWHR 4D or equivalent
PALCO lands ¹	69,231	55,380
Action area (outside of PALCO lands) ²	62,491	122,908
Regional area (outside of PALCO lands) ^{2,3}	641,114	1,276,264
Range-wide (outside of PALCO lands) ²	685,994	1,332,196

¹ Habitat information derived from PALCO 1999. Vegetation inventory. Unpublished technical information.

² Habitat information for California derived from The Resource Agency of California (1993). The Report of the California Timberland Task Force. Revised May, 1996.

³ The regional area is defined as Mendocino, Humboldt, and Del Norte Counties, California, and Curry County, Oregon. Since the California red tree vole does not occur in OR, acres of potentially suitable habitat in Curry County are not included in these figures.

Factors affecting species and suitable habitat in the action area

Other completed or contemporaneous actions

Refer to **Baseline common to all species** section above.

Other protective measures

A majority of this species range is on private timber lands in northern California. No State or Federal regulatory measures exist to specifically protect the California red tree vole or its habitat. Consideration of significant impacts to listed and non-listed species is provided in the CEQA Regulations (14 CCR §15380) and the CFPRs (14 CCR § 919.4) respectively. These State regulatory measures may provide some level of protection for the red tree vole.

Northern red-legged frog

Baseline information on northern red-legged frog populations outside the PALCO ownership is not available. Due to limitations of existing data, the following baseline discussion will pertain to the PALCO ownership, with limited general assumptions of lands within the action area outside of PALCO ownership.

Species

Numbers and distribution

Based on incidental observations, the northern red-legged frog is assumed to be locally abundant in suitable habitat within PALCO lands (PALCO 1998). However, without statistically valid survey data, the assumption of local abundance can be questioned. Specific information on numbers and distribution within the ownership is unavailable. The subspecies has been described as being associated with old-growth, late-successional and mature habitats, but has also been found in lower abundance in other seral stages (Bury and Corn 1988, Aubry and Hall 1991). Because of past management activities affecting terrestrial habitat, it is likely populations of the northern red-legged frog on PALCO lands and the larger action area are disjunct and isolated due to habitat fragmentation.

Reproduction

Information on reproductive trends is not available for the subspecies.

Suitable habitat

Landscape comparison

Northern red-legged frog microhabitats are expected to be found in cold, slow-moving reaches and pools in Class I and II streams and wetlands. Suitable habitat for the subspecies is difficult to estimate given the lack of information pertaining to vegetative and aquatic associations on the landscape. Table 3.8-1 in the Final EIS/EIR summarizes stream miles on PALCO lands, including Elk River lands, as follows: 264 miles of Class I streams; 752 miles of Class II streams (total class I and II= 1,016 miles). Additionally, table 3.7-3 in the Final EIS/EIR lists 486 acres of wetlands. The proposed Headwaters Reserve includes the following miles of stream: 17 miles of Class I and 27 miles of Class II. All miles of stream are described as suitable due to absence of stream morphology descriptors in this ownership. Due to the subspecies' affinity for pools and slow-moving reaches, this is likely a substantial overestimation of suitable aquatic habitat. For comparison, Welsh and Ollivier (1998) found the percentage of pools in channels (step pools and main channel or backwater pools) for ten non-fish bearing streams on comparable lands (tributaries of Prairie Creek) ranged from 3 to 26 percent. Though this study excluded Class I systems, it does indicate that only some proportion of streams in this area may contain mesohabitat types more likely to be suitable for the subspecies.

The Final EIS/EIR summarizes current stream habitat conditions for PALCO lands in section 3.8.2. Overall, these aquatic systems are not in good condition. All five WAAs are generally characterized as having high incidences of sedimentation, low percent pools, shallow mean pool depth and/or high temperatures. For purposes of this consultation, we assume that many of the

existing step pools would not provide the depth required by the species. Similarly, many of the main channel pools are susceptible to stagnation and warming unless they have a nearby source of cold water, such as a spring or seep.

The estimate of suitable habitat provided in the Final EIS/EIR excludes acres of terrestrial habitat which could be used for foraging and overwintering. For the purposes of describing terrestrial habitat, we assume a distance of 530 feet would include potential upland use areas along Class I and II streams, as proposed by Welsh et al. (1998). Higher quality suitable forested habitat within that zone is assumed to consist of mid-mature, late-successional and old-growth stands because of the higher amount of protective canopy and herbaceous cover used by the subspecies. However, an estimate of these acres is not available for this analysis. Based on a 530 foot zone of use along 1,016 miles of Class I and II streams, a total of 134,047 acres of potentially suitable habitat for the subspecies occurs on PALCO lands. This is likely an overestimate because probably not all acres within the 530 foot zone of use are suitable or accessible.

Limited comparative information is available for the action area and north coast region outside of PALCO lands. Approximately 1,377 miles of Class I streams occur in the Action Area outside of PALCO lands (Appendix D). The GIS layer available for this analysis did not provide complete coverage of Class II and wetlands within this zone, therefore data for these areas are unavailable. PALCO lands cannot be accurately compared to the action area due to a lack of information on Class II streams in the action area.

Although data outside the action area is not analyzed here, some generalizations can be made. A significant proportion of the north coast is under private ownership, much of which is industrial timberland. These lands have been under heavy management over the past century, so it is likely a large proportion of terrestrial habitat within the subspecies range has been fragmented, and aquatic habitat has been impacted.

As discussed under the range-wide baseline account, a total of 5.6 million acres occur within Riparian Reserves on Federal lands within the subspecies' range. PALCO lands contain an estimated 134,047 acres of potentially suitable habitat: approximately 2 percent of the total acreage on Federal and PALCO lands combined. These figures provide gross estimates and should be considered with caution for the following reasons: 1) private lands data outside of the ownership within the subspecies range is unavailable; 2) the acres within Riparian Reserves on Federal lands do not consider terrestrial habitat which may be used beyond those distances established by Riparian Reserves, i.e. beyond the one or two potential tree height distances; and, 3) portions of the riparian reserves on Federal lands may be unsuitable or inaccessible.

In summary, we assume natural conditions are highly variable within the northern red-legged frog's range. Additionally, current habitat conditions and management practices between federal and private ownerships will result in variable habitat conditions now and in the long-term. PALCO lands represent a relatively small percent of potential habitat in the subspecies' range.

Factors affecting species and suitable habitat in the action area

Other protective measures

Existing land allocations and State environmental regulations may provide some protection for the northern red-legged frog. Some suitable habitat is partly to fully protected in waters such as park lands or rivers designated as Wild and Scenic under Federal law.

CEQA Regulations (14 CCR Sec. 15380) and the CFPR (14 CCR Sec. 919.4) provide for the assessment of significant impacts on listed and non-listed species. These regulations may provide some level of protection for the northern red-legged frog. Habitat features are considered adequately protected by the state if identified and classified in the THP development process. Northern red-legged frogs generally occur in habitats protected as Class I and II watercourses under CFPRs (Article 12, Parts 916.5, 936.5 and 956.5). Those rules require maintenance of 50 percent canopy cover in a buffer zone of 50 to 150 feet (depending on stream class and slope).

CFPR Sections 914.7, 934.7, and 954.7 describe limitations of winter timber operations. While tractor yarding shall only be conducted in the winter period with a winter operations plan, cable, helicopter, or balloon yarding methods are allowed. These actions may occur only if the wet weather road use restrictions and other disturbance avoidance measures described can be met. The intent of the CFPR provisions is to minimize soil erosion and compaction during harvest operations. A reduction or prevention of activities within terrestrial habitat during rainy periods is expected to reduce impacts to the subspecies both on land and in the water.

Foothill yellow-legged frog and northwestern pond turtle

Baseline information on northwestern pond turtle and foothill yellow-legged frog populations outside the PALCO ownership is not available. Due to limitations of existing data, the following baseline discussion will pertain to the PALCO ownership, with limited general assumptions of lands within the action area outside of PALCO ownership.

Species

Numbers and distribution

Population numbers and trends for the northwestern pond turtle and the foothill yellow-legged frog within PALCO lands or the action area are not known. Additionally, surveys specific to the pond turtle or yellow-legged frog have not been conducted on the PALCO ownership.

The northwestern pond turtle has been observed in the Yager and Eel WAAs (PALCO 1998). The northern California region is considered a "stronghold" for the range of the northwestern pond turtle (Holland 1998). Large populations are known to occur, particularly in the Klamath and Hayfork drainages, and compared with other areas in the range, at least some populations on the California portion of the Klamath for example, show little evidence of recruitment declines (Holland 1991).

It is not known what percentage of the rangewide population occurs on the PALCO ownership, whether this subspecies historically occurred in high densities, or what role this ownership plays in

the overall conservation of this subspecies. It can be surmised that given the topographic landscape, this area historically would have had populations in some areas, but may not have supported a large population. PALCO streams make up small proportion of the overall range, so contributions of this area to the subspecies as a whole are not likely significant.

The SYP/HCP indicates that the foothill yellow-legged frog is locally abundant and widely distributed throughout suitable habitat, with incidental sighting records along major water courses such as the Eel and Van Duzen Rivers, and within Yager, and Bear-Mattole WAAs. Anecdotal observations of the foothill yellow-legged frog have been recorded in areas along smaller Class II streams with low canopy cover on PALCO lands (P. Detrich, pers. comm., July 28, 1998, in Final EIS/EIR). Although this species has not been documented to occur on Elk River Timber Company lands (PALCO 1998), it may occur there based on the availability of habitat.

Reproduction

Information on reproduction of the northwestern pond turtle or foothill yellow-legged frog is not available for PALCO lands or the action area.

Suitable habitat

Landscape comparison

Suitable habitat for the northwestern pond turtle and the foothill yellow-legged frog is difficult to estimate for PALCO lands or the action area given the lack of specific information pertaining to vegetative and aquatic associations on the landscape. Therefore, the following discussions will refer to PALCO lands only as described in the Final EIS/EIR.

Northwestern pond turtle

The estimation of suitable aquatic habitat is likely an overestimate, because not all miles of Class I and II streams contain the microhabitat characteristics suitable for pond turtles. Tables 3.7-3 and 3.8-1 in the Final EIS/EIR summarize wetlands and stream miles on PALCO lands, including Elk River lands, as follows: 264 miles of Class I streams, 752 miles of Class II streams, and 486 acres of wetlands. The proposed Headwaters Reserve includes the following: 17 miles of Class I and 27 miles of Class II. A maximum estimation of 1,060 miles of Class I and II streams and 486 acres of wetlands occur on PALCO lands, Elk River lands, and Headwaters Reserve.

Without specific suitable habitat attributes to quantify the adjacent terrestrial habitat, a maximum estimate of 199,000 acres of potential northwestern pond turtle terrestrial habitat occur on PALCO lands (along Class I - 264 miles; along Class II - 752 miles). Additional habitat may occur adjacent to mapped wetlands, but this figure is unknown. This estimate considers terrestrial habitat 1,640 feet from water's edge, and likely represents a substantial overestimation for the following reasons. Lacking information on microsite conditions (i.e., soil conditions or previous management) all land with slopes ≤ 50 percent is considered suitable. Though some terrestrial overwintering sites have been found on hillsides with slopes of 55 percent, most occur on slopes less steep than this. As described in Holland (1991), pond turtles in the north coast region are

most abundant in medium-sized, shallow, warm streams. Most likely, a minority of the streams included in this analysis meet these conditions.

A stream habitat assessment is summarized in table 8 of Volume I, SYP/HCP which presents average values for stream habitat variables. A variable important for the northwestern pond turtle are pools. Streams sampled in WAAs on the ownership averaged 14 to 45 percent pools. These percentages were compared with the miles of streams in the given WAA (table 3.8.1, Final EIS/EIR) to estimate a minimum estimate of suitable stream miles. Most of the wetlands occur in lower landscape positions and are associated with riparian areas (Final EIS/EIR, page 3.721).

Table 33. Northwestern Pond Turtle Minimum Habitat Estimation:

<u>WAA</u>	<u>Miles of Class I and II</u>	<u>% Pools</u>	<u>Estimated Suitable Stream Miles</u>
Humboldt	153.4	45	69
Yager	178.8	22	39
Van Duzen	113.8	14	16
Eel	360.1	23	83
Bear/Mattole	<u>160.1</u>	15	<u>24</u>
Total	966*		231

*Total stream miles do not add up correctly in Table 3.8-1 of Final EIS/EIR

Assuming turtles will use terrestrial habitats adjacent to stream miles containing suitable attributes, a gross estimate was made using 1,640 feet from the water's edge. Therefore, an estimated minimum of 91,840 acres of terrestrial habitat may occur along 231 miles of stream within PALCO ownership.

Limited comparative information is available for the action area and north coast region outside of PALCO ownership. Approximately 1,377 miles of Class I streams occur in the action area outside of PALCO ownership. The GIS layer available for this analysis did not provide complete coverage of Class II and wetlands within this zone, therefore data for these areas are unavailable. Data outside this area is not analyzed here, however some generalizations can be made. A significant proportion of the northern coastal area is under private ownership, much of which is industrial timberland. These lands have been under heavy management over the past century, so it is likely a large proportion of terrestrial habitat within the subspecies range in this area is fragmented, and aquatic habitat has been impacted.

Data for a range-wide landscape comparison for the subspecies was not available.

Foothill yellow-legged frog

The Final EIS/EIR describes suitable habitat for the foothill yellow-legged frog to include miles of Class I and II streams only. However, terrestrial habitats are essential for this species (Welsh et al. 1998). Few data are available to support estimation of the width of streamside use zones for this species. Based on Reid and Hilton's (1998) recommendation that riparian buffer widths should be about 1.1 site potential tree height, and on modeling of buffer zones based on projected LWD input, the FWS determined the distance of 230 feet distance from water's edge to estimate the terrestrial habitat most likely to be utilized by the foothill yellow-legged frog. The literature contains some documented locations of the yellow-legged frogs species occurring in terrestrial habitat more than 230 feet from waters (Welsh et al. 1998), but no information were available on vegetation, season, or other microhabitat specificity. Some small proportion of individuals may occur at distances further than 230 feet from the waters edge, but the majority of individuals will likely occur within this distance. Based on this distance, foothill yellow-legged frog terrestrial habitat on PALCO lands is estimated to include 16,362 acres along Class I, and 41,741 acres along Class II streams (total = 58,103 acres). Additional habitat may occur adjacent to 486 acres of mapped wetlands, but this figure is not available.

Limited comparative information is available for the action area and north coast region outside of PALCO ownership. Approximately 1,377 miles of Class I streams occur in the action area outside of PALCO ownership. The GIS layer available for this analysis did not provide complete coverage of Class II and wetlands within this zone, therefore data for these areas are unavailable. Data outside this area is not analyzed here, however some generalizations can be made. A significant proportion of the northern coastal area is under private ownership, much of which is industrial timberland. These lands have been under heavy management over the past century, so it is likely a large proportion of terrestrial habitat within the species range in this area is fragmented, and aquatic habitat has been impacted.

As discussed under the range-wide baseline account, a total of 11.5 million acres occur within Riparian Reserves on Federal lands within the species' range. Not all the acres within Riparian Reserves may be suitable because of the microhabitat conditions selected by this species. PALCO lands contain an estimated 58,103 acres of potentially suitable habitat, less than 1 percent of the total acreage on Federal lands. These figures provide gross estimates and should be considered with caution because private lands data outside of the ownership within the species range is unavailable.

In summary, we assume natural conditions are highly variable within the foothill yellow-legged frog's range. Additionally, current habitat conditions and management practices between federal and private ownerships will result in variable habitat conditions now and in the long-term. PALCO lands represent a relatively small percent of potential habitat in the species' range.

Distribution/Quality

Suitable habitat in the action area for the northwestern pond turtle and the yellow-legged frog is assumed to occur at elevations ranging from sea level to 6,000 feet. Suitable habitat within this

area is climatically, topographically, and hydrographically similar, regardless of location on the ownership, due to proximity to the coast. Most wetlands are found at lower elevation (Final EIS/EIR). The greatest amount (186 acres) of wetlands are found in the Eel River WAA; 80 percent and 70 percent of which are located in forested areas and WLPZs (Final EIS/EIR page 3.10-25), respectively. On PALCO lands, the amount of suitable habitat for these species has likely declined over the past 150 years, due to current and historic land use practices (e.g., grazing, timber harvest, road construction, and mining). This ownership likely contains a relatively small percent of potential habitat for the northwestern pond turtle and yellow-legged frog when compared to the species' ranges. Also, landscapes in the action area outside of the ownership have been intensively managed during the past 150 years. These land uses have altered water temperature, channel morphology, and the suitability of upland habitats. A more refined and accurate assessment of suitable habitat may become available as the amphibian and reptile assessment modules of the watershed analysis process are developed. See additional information in **Aquatics Baseline**.

Factors affecting species and suitable habitat in the action area

Other protective measures

See this discussion for northern red-legged frog above.

Tailed frog

Species

Numbers

No census data are available for the action area.

Landscape Comparison

No data are available to enable landscape comparisons, but see the comparison below for suitable habitat and occupancy.

Reproduction

No reproductive data are available for the action area.

Suitable habitat

Acreage and distribution

Amounts of suitable habitat on PALCO lands are uncertain. As stated in the Final EIS/EIR, the majority of habitat is found along Class II stream reaches. However, given the specificity of their habitat associations (Welsh et al. 1993), it is improbable that the entire 386 miles of Class II streams with late successional forest habitat are suitable. In addition, other studies document significant habitat and population losses in disturbed landscapes (Welsh and Ollivier 1998, Welsh et al., 1993, Welsh et al. 1998); this factor would reasonably be expected to have habitat on the PALCO ownership.

Landscape comparison

The PALCO ownership (approximately 211,000 acres) make up 0.063 percent of the documented range (33.46 million acres) of the species. The action area (815,063 acres), including PALCO lands plus adjacent lands subject to influence, makes up about 2.4 percent of the species range.

Several recent studies in northwestern California enable comparisons in habitat quality and occupancy between managed and unmanaged redwood timberlands. The discussion below applies those studies to PALCO lands. All of the studies are based on presence/absence data, so the results lend insight into the comparative availability of suitable habitats and population responses to those habitats. Because of the way the studies were structured, the issue of habitat availability cannot be separated from that of population responses. Consequently, this discussion should also shed light on the landscape comparison (above) for animal numbers. One of the studies took place on PALCO lands (Wroble and Waters 1989) and the remainder took place on comparable industrial timberlands, reserved parklands and managed National Forest lands. All the studies, except one, were contained within Del Norte, Humboldt, Trinity and Mendocino Counties. Three inferences can be drawn from the studies outlined in the three numbered sections below. First, suitable habitats appear to be declining in abundance; second, populations appear to be declining; and third, the known capability of the tailed frog to disperse and colonize suitable habitat is diminished. Taken together, these inferences are consistent with the features of a decline in a metapopulation, in which the loss of habitat patches increases the effective distance between the remaining suitable patches to a point where it exceeds the dispersal capability of the species (e.g., see Wiens, 1996).

(1) *Evidence of losses of suitable habitat.* Wroble and Waters (1989) surveyed portions of 17 streams on PALCO lands for tailed frog and southern torrent salamander. They subdivided their sample into disturbed and undisturbed stream reaches based on the proximity of earlier harvests. By their definition, a disturbed reach would either marginally meet or fail to meet the canopy closure requirement for this species found in Welsh, et al. (1993) (see the discussion of canopy closure in *Life History*, above). Wroble and Waters (1989) found tailed frogs on 11 of 16 (69 percent) undisturbed reaches, and 7 of 17 (41 percent) disturbed reaches (not a statistically significant difference), but speculated that the difference may be attributable to unstable parent geology and higher sediment influx. However, Welsh et al. (1998) surveyed ten streams at Prairie Creek Redwoods State Park, with explicit experimental controls for parent geology, and found no correlation with frog abundance or presence. With this additional information, Welsh et al. (1998) offered the alternative explanation that consolidated streamside parent materials are more resistant to erosion and soil loss, so if the species is found predominantly on these sites, then it is an indication that suitable habitat is being lost on the more vulnerable unstable stream reaches. The FWS believes that the more rigorous experimental controls in Welsh et al. (1998) lends greater weight to their interpretation.

(2) *Evidence of reduced abundance.* No data are available showing census trends on intensively managed lands versus protected lands. However, Welsh et al. (1998) compared two studies of frog sightings per unit of effort that demonstrate statistically significant differences in relative abundance. Wroble and Waters (1989) reported an average of 0.108 sightings per hour of search

time from 17 drainages on PALCO lands. In contrast, Welsh and Ollivier (unpublished data) found 2.40 frogs per hour of search time on 10 streams at Prairie Creek Redwoods State Park. This is a twenty-two-fold difference and is statistically significant (Mann-Whitney test; $Z = 4.30$, $p = 0.0001$). However, with existing information it is difficult to evaluate the comparability of these studies, which could be influenced by differences in methodology and observer skill. (Also see the discussion in (1) above on stream channel parent geology.) In addition, landscape-level studies in the Pacific northwest have revealed statistically significant negative correlations between tailed frog presence (and abundance) and the extent of harvesting in the surrounding watershed (e.g., Bull and Carter 1996, Corn and Bury 1989). Similarly, Hawkins et al. (1988) report significant positive correlations between tailed frog larval abundance and the amount of surviving remnant forest in areas impacted by the Mount St. Helens eruption.

(3) Evidence of reduced dispersal capability. The tailed frog has a highly subdivided population and low dispersal capability. One generalization about this set of attributes is that the species is highly susceptible to further fragmentation of its habitat and population. Welsh et al. (1998) consider this species to be the "... most sensitive to ecosystem perturbations of all the stream amphibians in the redwood region." As habitat patches are lost and remaining habitat patches become isolated, it becomes increasingly difficult for a sedentary species to recolonize unoccupied patches of suitable habitat (Hanski 1977).

Welsh et al. (1993) provided a test of this prediction by subdividing a large presence/absence data set (collected throughout the species range in northwestern California) into four subsets: clearcuts, young forest, mature forest and old-growth forest. The results are shown as the percentage of suitable sites that are occupied, and are as follows: clearcuts (36 percent), young forest (50 percent), mature forest (64 percent), and old-growth forest (66 percent). The results are generally consistent with the test prediction. When the results were pooled and compared (clearcuts plus young versus mature plus old-growth) the pooled results were statistically significant.

Other protective measures

Tailed frogs generally occur in habitats protected as Class II Watercourses under CFPRs (Article 12, Parts 916.5, 936.5 and 956.5). Those rules require maintenance of 50 percent canopy cover in a buffer zone of 50 to 100 feet (depending on slope). However, in Welsh et al.'s (1993) habitat model, threshold (minimum) canopy cover for the presence of tailed frogs is approximately 86 percent. In light of this information, and in light of current habitat and population trends, including those on privately managed lands, the past effectiveness of the CFPR protection measures is open to question.

Southern torrent salamander

Species

Numbers

No census data are available for the action area.

Landscape Comparison

No data are available to enable landscape level comparisons, but see the comparison, below, for suitable habitats and occupancy.

Reproduction

No reproductive data are available for the action area.

Suitable Habitat

Acreage and distribution

Amounts of suitable habitat on PALCO lands are uncertain. As stated in the Final EIS/EIR, the majority of habitat is found along Class II stream reaches, with lesser amounts where cold water seeps join Class I reaches. However, given the specificity of their habitat associations, it is improbable that the entire 386 miles of Class II streams with late-successional forest habitat are suitable. Ollivier (pers. comm., 1998 and 1999) advises, based on survey experience in similar areas, that (a) mapped Class III reaches probably contain some perennially wetted seepage areas that are suitable habitat, and (b) occupied habitat is frequently found around upland springs and seeps in Class III drainages. Welsh and Lind (1992) report 0.18 suitable habitat sites per stream mile and 0.11 occupied suitable habitat sites per stream mile in northwestern California, based on a study area which included coastal and interior areas under private and public ownership. For Class II reaches, this yields a gross estimate of 70 total sites within suitable habitat, of which approximately 50 are occupied (386 miles multiplied by 0.18 suitable sites per mile; and 386 miles multiplied by 0.11 occupied sites per mile). There is not enough information available to make a quantitative estimate for Class I and III reaches, nor for upland springs and seeps.

Landscape Comparison

The PALCO lands (approximately 211,000 acres) make up 2.03 percent of the documented range (10.45 million acres) of the species. The action area (815,063 acres), including PALCO lands, make up 7.8 percent of the species range.

Several recent studies in northwestern California enable comparisons in habitat quality and occupancy between managed and unmanaged redwood timberlands. Several of the studies named above in the corresponding discussion on the tailed frog also included field observations of southern torrent salamanders; all of the inferences proposed in that discussion are applicable here.

(1) *Evidence of losses of suitable habitat.* Wroble and Waters (1989) survey, described above under the tailed frog discussion, also included field observations of the southern torrent salamander. Again, by their definition, a disturbed reach would either marginally meet or fail to meet the canopy closure requirement for this species found in Welsh and Lind (1996) (see the discussion of canopy closure in **Life History**, above). Similarly they found salamanders on 8 of 27 undisturbed reaches (29.6 percent), and 17 of 28 disturbed reaches (3.6 percent). In this instance the difference was statistically significant at a high degree of confidence. The authors' proposal that the difference may be attributable to unstable parent geology was also applied to this species.

(2) *Evidence of reduced abundance.* No data are available showing population trends on intensively managed lands versus protected lands. However, Welsh et al. (1998) compared two previous studies of salamander sightings per unit of effort to show that there are significant differences in relative abundance. Wroble and Waters (1989) reported an average of 0.052 sightings per hour of search time from 17 drainages on PALCO lands. In contrast, Welsh and Ollivier (unpublished data) found 0.724 salamanders per hour of search time on ten streams at Prairie Creek Redwoods State Park. The difference is fourteen-fold and is highly significant (Mann-Whitney test; $Z = 2.93$, $p = 0.003$). Welsh et al. (1998) report that Wroble and Waters (1989) attributed their low success rate to local parent geology. Welsh et al. (1998) tested this claim by evaluating a much larger data set (83 localities throughout the species range in northern California) and found no correlation between salamander presence and parent geology. Again, the studies were conducted in coastal forest and redwood ecosystems, with one on PALCO lands, and we believe that the general inferences are reasonably and specifically applicable to the action area.

Other protective measures

Southern torrent salamanders generally occur in habitats protected as Class II Watercourses under CFPRs (Article 12, Parts 916.5, 936.5 and 956.5). Those rules require maintenance of 50 percent canopy cover in a buffer zone of 50 to 100 feet (depending on slope). However, in Welsh and Lind's (1996) habitat model, threshold (minimum) canopy cover for the presence of southern torrent salamanders is approximately 80 percent. In light of this information, and in light of current habitat and population trends, including those on privately managed forestlands, the effectiveness of the CFPR protection measures is open to question.

Northern California ESU steelhead

Steelhead are the most widely distributed salmonid species within the action area. They have been documented in Freshwater Creek, Elk River, Yager Creek, several tributaries to the Eel River, the Van Duzen River watershed, and the Bear and Mattole Rivers. According to the Final EIS/EIR, there is approximately 152 miles of suitable steelhead habitat within the action area.

In the mainstem of Freshwater Creek, HFAC trapped 288 0+ age steelhead in 1996. HFAC also trapped fish in various Freshwater Creek tributaries (IFR 1998). According to the Final EIS/EIR, CDFG (1995) observed 56 adult steelhead in the North Fork Elk River. CDFG electrofishing surveys in 1991-1993 found variable populations of steelhead in several Yager Creek tributaries (IFR 1998). The Final EIS/EIR noted that CDFG (1995) reported 32 steelhead adults from the Yager Creek watershed. The survey method was not reported. In the Van Duzen River drainage, steelhead juveniles and adults were found in Cummings, Grizzly, Hely, Root, and Stevens creeks by CDFG (1995; cited in SYP/HCP). CDFG (1995) also reported adult and juvenile steelhead in several Eel River tributaries. CDFG electrofishing surveys of several Eel River tributaries also found small numbers of steelhead in 1990 to 1992 (IFR 1998). The Final EIS/EIR states that steelhead are present in Rattlesnake Creek and the mainstem Mattole River (CDFG 1995) and the Bear River.

According to the Final EIS/EIR, PALCO has released hatchery-raised steelhead into the Yager Creek watershed from their facility on Cooper Mill Creek. Release numbers have ranged from 3,427 to 30,000 fish/year over the past 15 years. PALCO has also released steelhead into the Eel River drainage.

Southern Oregon/California Coasts ESU coastal cutthroat trout

There are very limited data available to determine the distribution and abundance of coastal cutthroat trout within the action area. The lower Eel River marks the southern boundary of the species' range. The Final EIS/EIR states that there are approximately 31 miles of suitable habitat within the action area.

On the mainstem Freshwater Creek, Humboldt Fish Action Council downstream migrant traps captured two 1+ age coastal cutthroat trout in 1989 and 12 1+ age coastal cutthroat trout in 1996 (IFR 1998). CDFG electrofishing surveys in 1994 found two coastal cutthroat trout in the Elk River drainage (IFR 1998). A 1998 downstream migrant trap operated by CDFG on the North Fork Elk River captured three 1+ age coastal cutthroat trout (IFR 1998). According to the Final EIS/EIR, coastal cutthroat trout have also been collected from Strongs Creek, a tributary to the lower Eel River.